```
        FILE 'MEDLINE, CAPLUS, BIOSIS, WPIDS, AGRICOLA,
EMBASE' ENTERED AT
        14:39:56 ON 22 DEC 2005
L1       9339696 S (CRYSTAL OR CRYSTALLOGRAPHY OR STRUCTURE)
L2          3625 S ((30S RIBOSOMAL SUBUNIT) OR (SMALL
RIBOSOMAL SUBUNIT))
L3         14487 S ((AMINOGLYCOSIDE ANTIBIOTICS)OR
(PAROMOMYCIN))
L4         68902 S ((THERMUS THERMOPHILUS) OR (PROKA?))
L5          1333 S L1 AND L2
L6            37 S L5 AND L3
L7             6 S L6 AND L4

=>  d abs
```

L7   ANSWER 1 OF 6   MEDLINE on STN

AB   A structural and mechanistic explanation for the selection of tRNAs by the ribosome has been elusive. Here, we report crystal structures of the 30S ribosomal subunit with codon and near-cognate tRNA anticodon stem loops bound at the decoding center and compare affinities of equivalent complexes in solution. In ribosomal interactions with near-cognate tRNA, deviation from Watson-Crick geometry results in uncompensated desolvation of hydrogen-bonding partners at the codon-anticodon minor groove. As a result, the transition to a closed form of the 30S induced by cognate tRNA is unfavorable for near-cognate tRNA unless paromomycin induces part of the rearrangement. We conclude that stabilization of a closed 30S conformation is required for tRNA selection, and thereby structurally rationalize much previous data on translational fidelity.

WEST Search History

DATE: Thursday, December 22, 2005

Hide?	Set Name	Query	Hit Count
		DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR	
☐	L15	(Brodersen$).in. AND L9	9
☐	L14	(Carter).in. AND L9	17
☐	L13	L11 AND L9	17
☐	L12	L11 AND L6	307
☐	L11	(Ramakrishnan$).in.	1163
☐	L10	L9 AND ((crystal OR crystallography OR structure)).clm.	182
☐	L9	L7 AND L5	1632
☐	L8	L7 AND L4	83417
☐	L7	L6 AND L4	83417
☐	L6	(crystal OR crystallography OR structure) AND L3	3345792
☐	L5	Thermus thermophilus	6140
☐	L4	(Aminoglycoside antibiotics)or (paromomycin)	144696
☐	L3	((30S ribosomal subunit) OR (small ribosomal subunit))	9267797
☐	L2	30S ribosomal subunit OR small ribosomal subunit	9267797
☐	L1	crystal OR crystallography OR structure	5628012

END OF SEARCH HISTORY

NCBI

PubMed

www.pubmed.gov

A service of the National Library of Medicine
and the National Institutes of Health

My NCBI ☐
[Sign In] [Register]

| All Databases | PubMed | Nucleotide | Protein | Genome | Structure | OMIM | PMC | Journals | Books |

Search PubMed for # | Preview | Go | Clear

Limits | Preview/Index | **History** | Clipboard | Details

About Entrez
NCBI Toolbar

Text Version

- Search History will be lost after eight hours of inactivity.
- To combine searches use # before search number, e.g., #2 AND #6.
- Search numbers may not be continuous; all searches are represented.
- Click on query # to add to strategy

Entrez PubMed
Overview
Help | FAQ
Tutorials
New/Noteworthy
E-Utilities

PubMed Services
Journals Database
MeSH Database
Single Citation Matcher
Batch Citation Matcher
Clinical Queries
Special Queries
LinkOut
My NCBI

Related Resources
Order Documents
NLM Mobile
NLM Catalog
NLM Gateway
TOXNET
Consumer Health
Clinical Alerts
ClinicalTrials.gov
PubMed Central

Search	Most Recent Queries	Time	Result
#12 Search **#11 AND #10**		14:19:13	16
#11 Search **Thermus thermophilus**		14:18:55	1549
#10 Search **Aminoglycoside antibiotics**		14:18:42	59609
#9 Search **#8 AND #7**		14:17:50	13
#8 Search **paromomycin**		14:17:31	1147
#7 Search **#5 AND #4**		14:17:19	762
#6 Search **#5 AND #6**		14:17:07	0
#5 Search **30S ribosomal subunit OR small ribosomal subunit**		14:16:48	3066
#4 Search **crystal OR crystallography OR structure**		14:16:23	600193

Clear History

Dec 19 2005 04:32:54

1N32V   Reports   BLink, Links

    Chain V, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065896|pdb|1N32|V[27065896]

1N32T   Reports   BLink, Conserved Domains, Links

    Chain T, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065895|pdb|1N32|T[27065895]

☐ **42:** 1N32S Reports   BLink, Conserved Domains, Links

    Chain S, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065894|pdb|1N32|S[27065894]

☐ **43:** 1N32R Reports   BLink, Conserved Domains, Links

    Chain R, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065893|pdb|1N32|R[27065893]

☐ **44:** 1N32Q Reports   BLink, Conserved Domains, Links

    Chain Q, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065892|pdb|1N32|Q[27065892]

☐ **45:** 1N32P Reports   BLink, Conserved Domains, Links

    Chain P, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065891|pdb|1N32|P[27065891]

☐ **46:** 1N32O Reports   BLink, Conserved Domains, Links

    Chain O, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065890|pdb|1N32|O[27065890]

☐ **47:** 1N32N Reports   BLink, Conserved Domains, Links

    Chain N, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched

At The First Codon Position At The A Site With Paromomycin
gi|27065889|pdb|1N32|N[27065889]

Chain M, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065888|pdb|1N32|M[27065888]

Chain L, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065887|pdb|1N32|L[27065887]

Chain K, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065886|pdb|1N32|K[27065886]

Chain J, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065885|pdb|1N32|J[27065885]

Chain I, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065884|pdb|1N32|I[27065884]

Chain H, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065883|pdb|1N32|H[27065883]

Chain G, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065882|pdb|1N32|G[27065882]

Chain F, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched

At The First Codon Position At The A Site With Paromomycin
gi|27065881|pdb|1N32|F[27065881]

☐ **56:** 1N32E <u>Reports</u>   <u>BLink</u>, <u>Conserved Domains</u>, <u>Links</u>

Chain E, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065880|pdb|1N32|E[27065880]

☐ **57:** 1N32D <u>Reports</u>   <u>BLink</u>, <u>Conserved Domains</u>, <u>Links</u>

Chain D, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065879|pdb|1N32|D[27065879]

☐ **58:** 1N32C <u>Reports</u>   <u>BLink</u>, <u>Conserved Domains</u>, <u>Links</u>

Chain C, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065878|pdb|1N32|C[27065878]

☐ **59:** 1N32B <u>Reports</u>   <u>BLink</u>, <u>Conserved Domains</u>, <u>Links</u>

Chain B, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound
To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched
At The First Codon Position At The A Site With Paromomycin
gi|27065877|pdb|1N32|B[27065877]

☐ **60:** 1N36V <u>Reports</u>   <u>BLink</u>, <u>Links</u>

Chain V, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit In The
Presence Of Crystallographically Disordered Codon And Near-Cognate Transfer
Rna Anticodon Stem-Loop Mismatched At The Second Codon Position
gi|27065976|pdb|1N36|V[27065976]

J Mol Biol. 2002 Jul 19;320(4):883-97.

Nature. 2000 Sep 21;407(6802):327-39.

Comment in:
    Nature. 2000 Sep 21;407(6802):306-7.

Structure of the 30S ribosomal subunit.

Wimberly BT, Brodersen DE, Clemons WM Jr, Morgan-Warren RJ, Carter AP, Vonrhein
C, Hartsch T, Ramakrishnan V.

MRC Laboratory of Molecular Biology, Cambridge, UK.

Genetic information encoded in messenger RNA is translated into protein by the ribosome, which is a large nucleoprotein complex comprising two subunits, denoted 30S and 50S in bacteria. Here we report the crystal structure of the 30S subunit from Thermus thermophilus, refined to 3 A resolution. The final atomic model rationalizes over four decades of biochemical data on the ribosome, and provides a wealth of information about RNA and protein structure, protein-RNA interactions and ribosome assembly. It is also a structural basis for analysis of the functions of the 30S subunit, such as decoding, and for understanding the action of antibiotics. The structure will facilitate the interpretation in molecular terms of lower resolution structural data on several functional states of the ribosome from electron microscopy and crystallography.

Functional insights from the structure of the 30S ribosomal subunit and its interactions with antibiotics.

Carter AP, Clemons WM, Brodersen DE, Morgan-Warren RJ, Wimberly BT, Ramakrishnan V.

MRC Laboratory of Molecular Biology, Cambridge, UK.

The 30S ribosomal subunit has two primary functions in protein synthesis. It discriminates against aminoacyl transfer RNAs that do not match the codon of messenger RNA, thereby ensuring accuracy in translation of the genetic message in a process called decoding. Also, it works with the 50S subunit to move the tRNAs and associated mRNA by precisely one codon, in a process called translocation. Here we describe the functional implications of the high-resolution 30S crystal structure presented in the accompanying paper, and infer details of the interactions between the 30S subunit and its tRNA and mRNA ligands. We also describe the crystal structure of the 30S subunit complexed

with the antibiotics paromomycin, streptomycin and spectinomycin, which interfere with decoding and translocation. This work reveals the structural basis for the action of these antibiotics, and leads to a model for the role of the universally conserved 16S RNA residues A1492 and A1493 in the decoding process.